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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Satoshi ARAKAWA

Appln. No.: 09/943,355

Confirmation No.: 8635

Filed: August 31, 2001

Docket No: Q66024

Group Art Unit: 2878

Examiner: Constantine Hannaher

For: METHOD AND APPARATUS FOR RECORDING AND READING OUT RADIATION IMAGES

SUBMISSION OF APPELLANT'S BRIEF ON APPEAL

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an original and two copies of Appellant's Brief on Appeal. A check for the statutory fee of $330.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

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WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: April 27, 2004

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APPELLANT'S BRIEF ON APPEAL UNDER 37 C.F.R. § 1.192

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Sir:

In accordance with the provisions of 37 C.F.R. § 1.192, Appellant submits the following:

I. REAL PARTY IN INTEREST

Appellants respectfully submit that the above-captioned application is assigned in its entirety to FUJI PHOTO FILM CO., LTD, a company organized under the laws of Japan.

II. RELATED APPEALS AND INTERFERENCES

Appellant states that, upon information and belief, Appellant is not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

This is an appeal from the final rejection dated October 29, 2003, wherein claims 1-20 were rejected.

The present application was filed on August 31, 2001 with claims 1-16. An Amendment Under 37 C.F.R. §1.111 was filed on September 22, 2003, adding new dependent claims 17-20. An Amendment Under 37 C.F.R. §1.116 was filed on January 29, 2004 amending claims 1, 6, 9 and 14. In the Advisory Action, mailed February 18, 2004, the Examiner indicates that the Amendment filed January 29, 2004 will be entered for purposes of Appeal. No further amendment were made to the claims.

Accordingly, claims 1-20 as set forth in the attached Appendix are the claims currently on appeal from the rejections set forth in the final Office Action mailed October 29, 2003.

IV. STATUS OF AMENDMENTS

The Amendment Under 37 C.F.R. § 1.116 filed on January 29, 2004 has been entered upon filing of this Appeal pursuant to the Advisory Action of February 18, 2004. The Amendment Under 37 C.F.R. §1.111 filed September 22, 2003 adding new claims as noted above has been entered (see Office Actions mailed October 29, 2003).

V. SUMMARY OF THE INVENTION

Appellant's invention is directed to radiation image recording and read-out method and apparatus where radiation image is stored on a stimulable phosphor sheet. The stimulable

phosphor sheet emits light when exposed to stimulating radiation in proportion to the amount of energy stored thereon. Thereby, the radiation image is read out from the stimulable phosphor sheet and converted into an electric signal. After the radiation image has been read out from the stimulable phosphor sheet, the energy remaining on the stimulable phosphor sheet is released by "erasing". Appellant's invention provides novel radiation image recording and read-out method and apparatus which allow (albeit, not require) the size of the radiation image recording and read-out apparatus to be minimized. (See specification, page 5, line 22 through page 16, line 22).

In this regard, Appellant's invention provides image recording and read-out method and apparatus where a stimulable phosphor sheet 2 is supported at a position for image recording, at which one surface of the stimulable phosphor sheet is exposed to radiation 13. When the surface of the stimulable phosphor sheet 2, which is supported at the position for image recording, is exposed to radiation 13, a radiation image is stored on the stimulable phosphor sheet 2. An image read-out operation may then be performed from a side of the other surface of the stimulable phosphor sheet 2 supported at the position for image recording, which other surface is opposite to the one surface of the stimulable phosphor sheet exposed to the radiation. The image read-out operation is performed by irradiating stimulating rays 31, from a source such as line light source 22, in two-dimensional directions to the stimulable phosphor sheet 2, on which the radiation image has been stored during its exposure to the radiation 13, the stimulating rays 31 causing the stimulable phosphor sheet 2 to emit light 35 in proportion to an amount of energy stored thereon during its exposure to the radiation 13, and photoelectrically detecting the emitted light 35. Thereby, an image signal, which represents the radiation image having been stored on

the stimulable phosphor sheet is obtained. (See Applicant's specification, page 17, line 16 through page 21, line 1; and Figs. 1-4.)

The energy which remains on the stimulable phosphor sheet after the image signal has been obtained from the stimulable phosphor sheet, is released by irradiating erasing light to an entire area of the stimulable phosphor sheet with a sheet-shaped erasing light source 40. The sheet-shaped erasing light source 40 is located in close vicinity to the stimulable phosphor sheet 2 and on a side of the one surface of the stimulable phosphor sheet supported at the position for image recording, which one surface is exposed to the radiation, the sheet-shaped erasing light source having uniform transmissivity to the radiation. The stimulable phosphor sheet 2 has a sheet-shaped transparent substrate 2A and a stimulable phosphor layer 2B. The sheet-shaped erasing light source 40 is arranged on one side of the sheet-shaped transparent substrate 2B, and the stimulable phosphor layer 2B is arrange on another side, which is opposite to the one side, of the sheet-shaped transparent substrate 2A. The stimulating rays 31 for the image read-out irradiate the stimulable phosphor layer 2 at the side opposite to the side exposed to the radiation 13. (See specification, page 21, line 2 through page 27, line 11; and Figs. 1, 5 and 6.)

VI. ISSUES

1) Whether claims 1-5, 7, 9-13, 15 and 17-20 are patentable over U.S. Pat. 5,115,132 to Saotome et al. (Saotome '132) in view of JP 11-38533A to Arakawa (Arakawa) under 35 U.S.C. § 103(a)[1].

2) Whether claims 6 and 14 are patentable over Saotome '132 and Arakawa in view of U.S. Pat. 4,814,616 to Saotome et al. (Saotome '616) under 35 U.S.C. § 103(a).

3) Whether claims 8 and 16 are patentable over Saotome '132 and Arakawa in view of Saotome '616 and further in view of Ohyama et al. (Ohyama) under 35 U.S.C. § 103(a).

VII. GROUPING OF CLAIMS

It is noted that for each of the second and third grounds of rejection the claims stand or fall together. For the first ground of rejection the rejected independent claims 1 and 9 stand or fall together, and that the dependent claims 2-6, 8, 10-14 and 16-20 stand or fall together with their respective base claims. However, dependent claims 7 and 15 recite additional, separately patentable features (see Section VIII below). Therefore, the rejections over the basic combination of Saotome '132 and Arakawa in the first ground of rejection do not stand or fall together.

[1] The final rejection implies the rejection is premised on the rejection of claims 7 and 15 in view of Saotome '132, Arakawa and Saotome '515. However, Saotome '616 was not used to reject claims 7 and 15.

VIII. ARGUMENTS

As an initial matter, claims 7 and 15 further restrict the methodology for a stationary sheet and thus simplify the process. Claims 7 and 15 are further patentable over the references for the reasons detailed below. Therefore, claims 7 and 15 do not stand or fall together.

Saotome '132 relates to recording along a belt where x-ray exposure is provided to one side of the belt and image reading and erasure is provided by conveying the belt to a read-out section, and erasure is further achieved by conveyance of the belt (see Id., Figs. 1 and 10).

On the other hand, Arakawa discloses an apparatus, for acquiring image information for energy subtraction processing, which includes radiation source 10 for radiating object 50, and stimulable phosphor sheet 20 for receiving radiation which passed through object 50. Multiple exposures are made of high and low energy radiation to front 21 and back 22 panels of stimulable phosphor sheet 20, which also includes an energy separator 23 between the panels 21 and 22. While Arakawa makes a passing mention of a stimulable phosphor sheet which comprises a transparent substrate and a single stimulable phosphor sheet (see Id., col. 11, line 57 through col. 12, line 2), the read out operation for such an arrangement is not taught or suggested, and is not a central aspect to the Arakawa disclosure.

Appellant respectfully submits that one skilled in the art would not have been motivated to combine the teachings of Saotome '132 and Arakawa. In particular, Arakawa relies on obtaining images based on a difference in energy levels and employs EL panel 30 for the purpose of accentuating this difference (see Arakawa, col. 9, lines 44-54). That is, EL panel 30 emits erasing light sufficient only to erase the high energy information S_h to a certain extent. This is

not conducive to the belt arrangement of Saotome where image erasing (i.e., complete, residual image erasing) is carried out in the course of rewinding of stimilable phosphor sheet (see Id., col. 16, line 27 through col. 17, line 46).

Appellant submits that the role of the erasing light source as defined in Appellant's claimed invention is totally different from that of the EL panel 30 of Arakawa. That is, the erasing light source in accordance with Appellant's claimed invention is arranged to release the <u>entire</u> energy stored on the stimulable phosphor sheet <u>after</u> the image signal has been obtained from the stimulable phosphor sheet, so that the stimulable phosphor sheet may be reused. On the other hand, the EL panel 30 of Arakawa is used to release only the high energy image information stored in <u>a part (i.e. a layer 21) of</u> the stimulable phosphor sheet <u>before</u> the image signal is read out. The EL panel 30 of Arakawa does not play a role of releasing the entire energy, and is incapable of rendering the stimulable phosphor sheet reusable. (See, for example, column 9, lines 44-54 of Arakawa.)

Appellant further submits that secondary references of Saotome '616 and Ohyama do not make up for the above-noted deficiencies of the primary combination of Saotome '132 and Arakawa.

Therefore, independent claims 1 and 9 are patentable for at least these reasons, and the remaining claims 2-8 and 10-16 are patentable at least based on their dependency.

Furthermore, Appellant's dependent claims 7 and 15 are distinguishable over the prior art at least for the following additional reasons. With the structure in which the stimulable phosphor

sheet is kept stationary in the fixed position, the operation of recording, reading and erasing can all be carried out without moving either of the stimulable phosphor sheet and the erasing light source. This renders the entire structure of the apparatus quite simple and compact. In addition, operation cycle time of the apparatus can be shortened. In Arakawa, the stimulable phosphor sheet is assumed to be forwarded to other positions for the reading and erasing operations, since the EL panel 30 cannot play a role of total erasing as mentioned above. In Saotome, either of the stimulable phosphor sheet (Figure 10) and the erasing light source (Figure 9A) is moved for the erasing operation. Therefore, no matter how the teachings of Arakawa and Saotome are combined, the simple and compact structure which may be achieved by advantageous (non-limiting) implementations of the embodiments of the Appellant's claimed invention cannot be derived from any reasonable combination of the cited prior art references.

The Examiner alleges that "strong erasing" (i.e., erasing to remove essentially all of the energy stored on a stimulable phosphor sheet) may somehow be achieved by Arakawa, and that "there is no barrier to implementing the EL panel approach to erasing of Arakawa in the method and apparatus of Saotome ['132]" (see final Office Action, page 9, first portion of paragraph 7). Appellant respectfully disagrees with the Examiner's analyses.

In particular, the disclosure of each of the prior art references must be considered in its entirety. Thus, the Arakawa reference <u>as a whole</u> does <u>not</u> teach "strong erasing", instead it teaches quite the opposite – acquiring image information for energy subtraction processing where erasing is performed to release energy stored only in a <u>part</u> of the stimulable phosphor sheet before the read-out of the image is finished, to thereby enable energy subtraction

processing. Thus, Arakawa teaches away from "strong erasing," because releasing all of the stored energy would preclude energy subtraction processing, making Arakawa's invention inoperative. On the other hand, the only "erasing" disclosed in Saotome '132 is for reusing the stimulable phosphor sheet, i.e., strong erasing where all of the energy stored on the entire stimulable phosphor sheet is erased after image read-out is finished. *See* MPEP §2141.02 (prior art must be considered in its entirety, including disclosures that teach away from the claims), *and* MPEP §2145(X)(D)(2) ("[i]t is improper to combine references where the references teach away from their combination" *citing In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)).

To the extent that the Examiner argues obviousness based on restraint of operation for erasing rather than incapacity, it is noted that the conceded restraint in the erasing is what makes the rejection improper. One cannot defeat the stated purpose and objects of a reference to support a prior art rejection. *See* MPEP §2143.01 (proposed modification cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference).

Accordingly, absent the disclosure of Appellant's own specification, one skilled in the art would not have been motivated to combine the opposing teachings of Saotome and Arakawa, to achieve an image recording and read-out apparatus and method where entire area of the stimulable phosphor sheet is irradiated by strong erasing light from a sheet-shaped erasing light source, as recited in Appellant's independent claims 1 and 9. When combining the teachings of Saotome and Arakawa the Examiner is relying on impermissible use of hindsight.

Furthermore, with regard to the dependent claims 7 and 15, the Examiner cites Fig. 9A of Saotome '132 as allegedly teaching a moving image read-out unit 104 and stationary phosphor sheet 102 (see final Office Action, page 9, second portion of paragraph 7). However, in this implementation of its radiation image recoding and read-out apparatus, Saotome '132 teaches the use of an erasing light source 131 constituted by a fluorescent lamp integrally mounted in a single, movable image read-out and erasing section 104 (see Id., col. 13, line 11 through col. 15, line 9). Clearly, one skilled in the art of radiation image recoding and read-out devices would not have been motivated to replace erasing light source 131 shown in Figs. 9A and 9B of Saotome '132 with a sheet-shaped erasing light source as required by claims 7 and 15 (which incorporate, by reference, all the features recited in their respective base claims 1 and 9).

Therefore, Appellant's independent claims 1 and 9, and dependent claims 2-8 and 10-20 (which incorporate all the novel and unobvious features of their respective base claims) would not have been obvious from any reasonable combination of the cited references. The separately grouped claims 7 and 15 are further patentable for the reasons set forth above.

The present Brief on Appeal is being filed in triplicate. Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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APPENDIX

CLAIMS 1-20 ON APPEAL:

1. A radiation image recording and read-out method, comprising the steps of:

i) supporting a stimulable phosphor sheet at a position for image recording, at which one surface of the stimulable phosphor sheet is exposed to radiation,

ii) exposing the one surface of the stimulable phosphor sheet, which is supported at the position for image recording, to the radiation, a radiation image being thereby stored on the stimulable phosphor sheet,

iii) performing an image read-out operation from a side of the other surface of the stimulable phosphor sheet supported at the position for image recording, which other surface is opposite to the one surface of the stimulable phosphor sheet exposed to the radiation, the image read-out operation being performed by irradiating stimulating rays in two-dimensional directions to the stimulable phosphor sheet, on which the radiation image has been stored during its exposure to the radiation, the stimulating rays causing the stimulable phosphor sheet to emit light in proportion to an amount of energy stored thereon during its exposure to the radiation, and photoelectrically detecting the emitted light, an image signal, which represents the radiation image having been stored on the stimulable phosphor sheet, being thereby obtained, and

iv) releasing energy, which remains on the stimulable phosphor sheet after the image signal has been obtained from the stimulable phosphor sheet, by irradiating erasing light to an entire area of the stimulable phosphor sheet with a sheet-shaped erasing light source, the sheet-shaped erasing light source being located in close vicinity to the stimulable phosphor sheet and

on a side of the one surface of the stimulable phosphor sheet supported at the position for image recording, which one surface is exposed to the radiation, the sheet-shaped erasing light source having uniform transmissivity to the radiation,

wherein the stimulable phosphor sheet comprises a sheet-shaped transparent substrate and a stimulable phosphor layer,

the sheet-shaped erasing light source is arranged on one side of the sheet-shaped transparent substrate, and the stimulable phosphor layer is arrange on another side, which is opposite to the one side, of the sheet-shaped transparent substrate, and

the stimulating rays for the image read-out irradiate the stimulable phosphor layer at the side opposite to the side exposed to the radiation.

2. A method as defined in Claim 1 wherein the sheet-shaped erasing light source comprises an organic electroluminescence device.

3. A method as defined in Claim 1 wherein the sheet-shaped erasing light source comprises a transparent sheet, which has light diffusing properties, the transparent sheet being capable of radiating out the erasing light from a surface, which stands facing the stimulable phosphor sheet, toward the stimulable phosphor sheet, and

light sources, each of which is located at one of two ends of the transparent sheet and produces the erasing light such that the erasing light enters from the one end of the transparent sheet into the transparent sheet.

4. A method as defined in claim 3 wherein at least either one of two surfaces of the transparent sheet is formed as a light diffusing surface.

5. A method as defined in Claim 3 wherein the transparent sheet contains light diffusing particles dispersed therein.

6. A method as defined in Claim 3, 4, or 5 wherein the stimulable phosphor layer is overlaid on the sheet-shaped transparent substrate, and

the transparent sheet of the sheet-shaped erasing light source acts also as the sheet-shaped transparent substrate of the stimulable phosphor sheet.

7. A method as defined in Claim 1, 2, 3, 4, or 5 wherein the stimulable phosphor sheet is kept stationary at the position for image recording, and

the image read-out operation is performed with a read-out unit for irradiating the stimulating rays to the stimulable phosphor sheet in a one-dimensional direction along a main scanning direction and detecting the light, which is emitted by the stimulable phosphor sheet when the stimulating rays are irradiated to the stimulable phosphor sheet in the one-dimensional direction, the read-out unit being moved in a sub-scanning direction.

8. A method as defined in Claim 7 wherein the read-out unit comprises a linear stimulating ray source, which linearly irradiates the stimulating rays to an area of the stimulable phosphor sheet, and

a line sensor, which is located along the linear area of the stimulable phosphor sheet exposed to the linear stimulating rays and photoelectrically detects the light emitted by the stimulable phosphor sheet when the stimulating rays are irradiated to the stimulable phosphor sheet.

9. A radiation image recording and read-out apparatus, comprising:

i) an image recording section for supporting a stimulable phosphor sheet at a position for image recording, at which one surface of the stimulable phosphor sheet is exposed to radiation,

ii) image read-out means located on a side of the other surface of the stimulable phosphor sheet supported at the position for image recording, which other surface is opposite to the one surface of the stimulable phosphor sheet exposed to the radiation, the image read-out means performing an image read-out operation by irradiating stimulating rays in two-dimensional directions to the stimulable phosphor sheet, on which a radiation image has been stored during its exposure to the radiation, the stimulating rays causing the stimulable phosphor sheet to emit light in proportion to an amount of energy stored thereon during its exposure to the radiation, and photoelectrically detecting the emitted light, an image signal, which represents the radiation image having been stored on the stimulable phosphor sheet, being thereby obtained, and

iii) a sheet-shaped erasing light source located in close vicinity to the stimulable phosphor sheet and on a side of the one surface of the stimulable phosphor sheet supported at the position for image recording, which one surface is exposed to the radiation, the sheet-shaped erasing light source having uniform transmissivity to the radiation, the sheet-shaped erasing light source releasing energy, which remains on the stimulable phosphor sheet after the image signal has been obtained from the stimulable phosphor sheet, by irradiating erasing light to an entire area of the stimulable phosphor sheet,

wherein the stimulable phosphor sheet comprises a sheet-shaped transparent substrate and a stimulable phosphor layer,

the sheet-shaped erasing light source is arranged on one side of the sheet-shaped transparent substrate, and the stimulable phosphor layer is arrange on another side, which is opposite to the one side, of the sheet-shaped transparent substrate, and

the stimulating rays for the image read-out irradiate the stimulable phosphor layer at the side opposite to the side exposed to the radiation.

10. An apparatus as defined in Claim 9 wherein the sheet-shaped erasing light source comprises an organic electroluminescence device.

11. An apparatus as defined in Claim 9 wherein the sheet-shaped erasing light source comprises a transparent sheet, which has light diffusing properties, the transparent sheet being capable of radiating out the erasing light from a surface, which stands facing the stimulable phosphor sheet, toward the stimulable phosphor sheet, and

light sources, each of which is located at one of two ends of the transparent sheet and produces the erasing light such that the erasing light enters from the one end of the transparent sheet into the transparent sheet.

12. An apparatus as defined in Claim 11 wherein at least either one of two surfaces of the transparent sheet is formed as a light diffusing surface.

13. An apparatus as defined in Claim 11 wherein the transparent sheet contains light diffusing particles dispersed therein.

14. An apparatus as defined in Claim 11, 12, or 13 wherein the stimulable phosphor layer is overlaid on the sheet-shaped transparent substrate, and

the transparent sheet of the sheet-shaped erasing light source acts also as the sheet-shaped transparent substrate of the stimulable phosphor sheet.

15. An apparatus as defined in claim 9, 10, 11, 12, or 13 wherein the stimulable phosphor sheet is kept stationary at the position for image recording, and

the image read-out means comprises:

a) a read-out unit for irradiating the stimulating rays to the stimulable phosphor sheet in a one-dimensional direction along a main scanning direction and detecting the light, which is emitted by the stimulable phosphor sheet when the stimulating rays are irradiated to the stimulable phosphor sheet in the one-dimensional direction, and

b) unit moving means for moving the read-out unit in a sub-scanning direction.

16. An apparatus as defined in Claim 15 wherein the read-out unit comprises a linear stimulating ray source, which linearly irradiates the stimulating rays to an area of the stimulable phosphor sheet, and

a line sensor, which is located along the linear area of the stimulable phosphor sheet exposed to the linear stimulating rays and photoelectrically detects the light emitted by the stimulable phosphor sheet when the stimulating rays are irradiated to the stimulable phosphor sheet.

17. The method as defined in claim 1, wherein the stimulable phosphor sheet is maintained at said position during said performing of the read–out operation and said irradiating of the erasing light source.

18. The apparatus as defined in claim 9, wherein the stimulable phosphor sheet is maintained at said position during operation of the read-out means and the erasing light source.

19. The method as defined in claim 1, wherein the erasing light is sufficient to erase substantially all of the energy which remains on the stimulable phosphor sheet after said performing of the read-out operation.

20. The apparatus as defined in claim 9, wherein the wherein the erasing light is sufficient to erase substantially all of said energy which remains on the stimulable phosphor sheet after the image signal has been obtained from the stimulable phosphor sheet.